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NATIONAL DAM INSPECTION PROGRAM. LITTLE YOUGHIOGHENY RIVER SITE--ETC(U)

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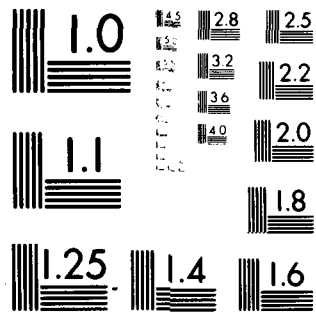
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OHIO RIVER BASIN
CHERRY GLADE RUN
GARRETT COUNTY

MARYLAND

James David Hainley
Timothy E. Debes

LITTLE YOUGHIOGHENY RIVER SITE NO. 2

NDI I.D. NO. MD 33

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

Little Youghiogheny River Site Number 2
(NDI ID. Number MD-33) Ohio River Basin
Cherry Glade Run, Garrett County, Maryland.

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Phase I Inspection Report

15 PACW 31-79-C-0038

PREPARED FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND 21203

BY

ACKENHEIL & ASSOCIATES, BALTIMORE, MD, INC.
7902 BELAIR ROAD
BALTIMORE, MARYLAND 21236

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase 1 investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase 1 investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigation and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase 1 investigation; however, the inspection is intended to identify any need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase 1 inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" (PMF) for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

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PHASE 1 REPORT
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: Little Youghiogheny Site No. 2
STATE LOCATED: Maryland
COUNTY LOCATED: Garrett
STREAM: Cherry Glade Run, a tributary of the Little Youghiogheny River
DATES OF INSPECTION: April 11, 1979, and May 24, 1979
COORDINATES: Lat. $39^{\circ} 25.5'$, Long. $79^{\circ} 23.5'$

ASSESSMENT OF GENERAL CONDITIONS: Based on the evaluation of available design information, and visual observations of conditions as they existed on the dates of the field reconnaissances, the general condition of Little Youghiogheny Site No. 2 is considered to be good.

Seepage, observed emanating from the left (east) stream bank of the outlet plunge pool, should be monitored for increases in flow or areal extent, and for development of internal erosion conditions. Measurements should be made to determine if seepage flow is affected by changes in reservoir pool level or seasonal fluctuations in ground water conditions.

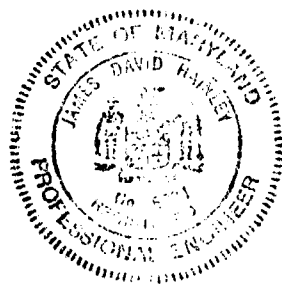
The wet zone located at the toe of the downstream embankment slope should be periodically observed to determine if a seepage condition is developing.

Little Youghiogheny Site No. 2 is classified as a "small" size, "high" hazard dam based on guideline criteria. Soil Conservation Service hydrological/hydraulic design computations indicate dam and spillway capacity is adequate to pass the PMF (100%) without overtopping the dam embankment. Therefore, spillway capacity is adequate and in accordance with recommended criteria.

The following recommendations should be implemented as soon as possible:

- 1) Monitor seepage emanating from the left (east) stream bank of the outlet plunge pool.
- 2) Maintain gate valve and replace stem shaft and guides.
- 3) Develop a formal flood surveillance and warning plan.
- 4) Develop a more thorough and active maintenance and inspection program. Program to include the following:
 - (a) Frequent maintenance and exercising of the reservoir drain gate valve.
 - (b) Observation of wet zone located at toe of dam for development of seepage conditions.

- (c) Observation of outlet pipe (end section) concrete surfaces for the development of significant cracking and spalling. Remedial repairs should be made as necessary.
- 5) Remove grass obstructing low stage orifice opening.
- 6) Repair eroded rills and footpaths, and backfill animal burrow holes located on embankment slopes.



James D. Hainley 24 July 77
 James D. Hainley, P.E. Date
 Maryland Registration No. 5284
 Vice President

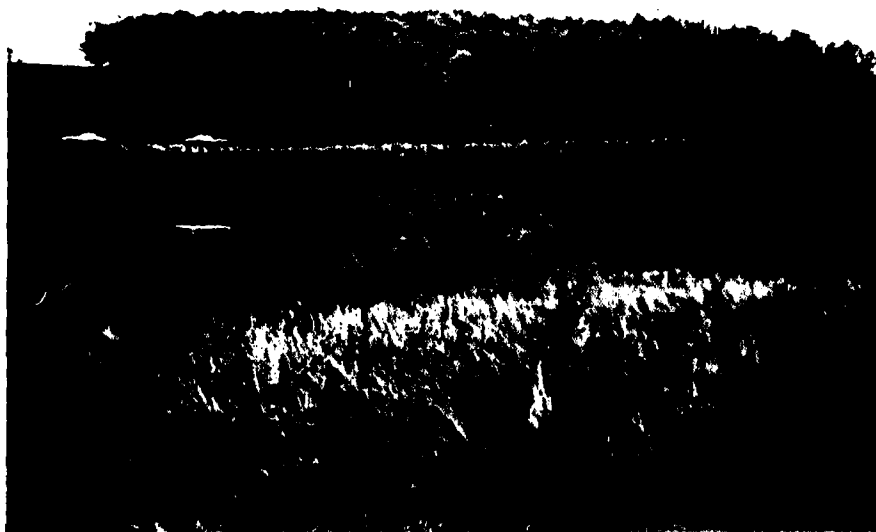
Timothy E. Debes 24 July 77
 Timothy E. Debes Date
 Project Engineer

APPROVED BY:

James W. Peck 30 July 77
 JAMES W. PECK Date
 Colonel, Corps of Engineers
 District Engineer

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LITTLE YOUGHIOGHENY SITE NO. 2



Upstream Embankment Slope



Downstream Embankment Slope

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PHASE 1 REPORT
NATIONAL DAM INSPECTION PROGRAM
LITTLE YOUGHIOGHENY SITE NO. 2
NATIONAL I.D. NO. MD 33

1.1 General

- a. Authority. The study was performed pursuant to the authority granted by the National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.
- b. Purpose. The purpose of this study is to evaluate if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Dam and Appurtenances

- 1) Embankment. The dam was constructed as a homogeneous earthfill structure. The embankment has a crest length of approximately 610 ft. Upstream and downstream embankment slopes have inclinations of 3H:1V and 2.5H:1V, respectively.
- 2) Seepage Control Provisions. According to as-built drawings, seepage control provisions include a seepage drain and a cutoff trench. The cutoff trench is located at the dam centerline and extends the entire length of the embankment. The seepage drain is located 30 ft. downstream of the dam centerline, is approximately 230 ft. long, and extends up abutment slopes to normal pool level (El. 2,465.6, 17.9 ft. below dam crest).
- 3) Flood Discharge Facilities. Flood discharge facilities consist of a principal spillway intake structure with pipe outlet and a 50 ft. wide emergency spillway. The intake structure contains a low stage orifice located at normal pool level and two (2) high stage riser crest openings. A 24 in. dia. reinforced concrete pipe is connected to the base of the intake structure and discharges into a stilling basin. The emergency spillway channel was excavated into natural earth and weathered rock at the right (west) dam abutment.

- b. Location. The Little Youghiogheny Dam Site No. 2 is located on Cherry Glade Run, a southwest flowing tributary of Wilson Run and the Little Youghiogheny River. The site is located approximately 1 mile north of Oakland, Maryland.
- c. Size Classification. The dam has a maximum storage capacity of 222 ac.-ft. and toe to crest height of 35.5 ft. Based on this criteria, the dam is classified as a "small" size structure.

- d. Hazard Classification. The dam is classified in the "high" hazard category. In the event of dam failure, significant damage to commercial and residential property and loss of life is considered likely.
- e. Ownership. The Garrett Soil Conservation District, Oakland, Maryland, a public watershed association, is legally responsible for the operation of Little Youghiogheny Site No. 2. The dam was constructed by easement of property owned by several individuals.
- f. Purpose of Dam. Little Youghiogheny Site No. 2 was constructed for the purpose of flood control.
- g. Design and Construction History. The dam was designed by the Soil Conservation Service, Engineering and Watershed Planning Unit, Upper Darby, PA. The Soil Conservation Service also supervised construction of the dam. Construction began in November, 1960.
- h. Normal Operating Procedure. The dam operates as an uncontrolled structure. Under normal conditions, the pool level is maintained at El. 2,465.6 by passage of normal base flow through the low stage principal spillway orifice.

1.3 Pertinent Data

- a. Drainage Area 0.48 sq. mi.
- b. Discharge at Dam Site

| | |
|--|-----------|
| Maximum known flood at dam site | Unknown |
| Ungated spillway capacity at design high water elevation | 520 cfs |
| Spillway capacity at top of dam elevation | 2,720 cfs |
- c. Elevation (feet above MSL)

| | |
|----------------------------------|-------------|
| Constructed top of dam | El. 2,483.5 |
| Design high water | El. 2,479.6 |
| Normal pool | El. 2,465.6 |
| Emergency spillway crest | El. 2,477.0 |
| Principal spillway high stage | El. 2,469.0 |
| Principal spillway low stage | El. 2,465.6 |
| Maximum tailwater | Unknown |
| Upstream invert of outlet pipe | El. 2,454.0 |
| Downstream invert of outlet pipe | El. 2,448.0 |
| Streambed at centerline | El. 2,455.0 |
- d. Reservoir Length

| | |
|------------------------|----------|
| Length of maximum pool | 0.33 mi. |
| Length of normal pool | 0.21 mi. |

e. Total Storage

| | |
|-------------------------------|---------------|
| Constructed top of dam | 222.0 ac.-ft. |
| Design high water | 137.0 ac.-ft. |
| Emergency spillway crest | 94.0 ac.-ft. |
| Principal spillway high stage | 32.4 ac.-ft. |
| Principal spillway low stage | 17.4 ac.-ft. |
| Normal pool | 17.4 ac.-ft. |
| Sediment pool | 17.4 ac.-ft. |

f. Reservoir Surface

| | |
|------------------------|------------|
| Constructed top of dam | 24.5 acres |
| Design high water | 18.3 acres |
| Normal pool | 3.4 acres |
| Sediment pool | 3.4 acres |

g. Dam

| | |
|-------------------|--|
| Type | Earthfill |
| Length | 610.0 ft. |
| Height | 39.5 ft. |
| Top width | 14.0 ft. |
| Side slopes | |
| Downstream | 2.5H:1V |
| Upstream | 3.0H:1V with 10 ft. wide berm at normal pool level |
| Zoning | None |
| Impervious core | None |
| Cutoff provisions | Cutoff trench |
| Grout curtain | None |

h. Regulating Outlet

| | |
|----------------------------------|--|
| Type | Concrete drop inlet structure and 24 in. dia. R.C. outlet pipe |
| Riser height | 19.7 ft. |
| Riser dimensions | 2x6 ft. (inside) |
| Length of connecting outlet pipe | 167.0 ft. |
| Gates | 8 in. gate valve (reservoir drain) |

i. Emergency Spillway

| | |
|--------------------|--|
| Type | Earth |
| Width | 50.0 ft. |
| Crest elevation | 2,477.0 ft. MSL |
| Gate | None |
| Upstream channel | Vegetated earth with negative 1.0% slope |
| Downstream channel | Vegetated earth with positive 1.8% slope |
| Length of channel | 450 ft. |

SECTION 2 DESIGN DATA

2.1 Design

a. Data Available

- 1) Hydrology and Hydraulics. The design report, Little Youghiogheny Watershed Project, Site No. 2 prepared by the Soil Conservation Service, contains design calculations, flood hydrographs, stage storage and discharge rating curves, and flood routing analysis. As-built drawings of the principal and emergency spillway were included with the design report.
- 2) Embankment. The design report and as-built drawings identified above contain soil test results, test boring and test pit logs, plans and cross sections, and geologist's report. Specifications for dam construction were included in Construction and Material Specifications for Little Youghiogheny Watershed, Flood Detention Reservoir No. 2, prepared by the Soil Conservation Service.
- 3) Appurtenant Structures. The documents identified in Section 2.1-a(2) include design drawings, construction specifications, and design calculations for the principal and emergency spillways.

b. Design Features. Soil Conservation Service "high" hazard (class "C") design storm criteria and Maryland State requirements were used to design the dam and appurtenances. Plate Nos. 1 through 5 illustrate principal design features.

- 1) Embankment. The embankment was constructed as a homogeneous earthfill structure from compacted silty gravel (GM), clayey gravel (GC) and clayey sand (SC). Soils were obtained from on-site borrow areas and were reportedly mixed before being incorporated into the embankment. Minimum compaction requirements were specified as 95% of maximum Standard Proctor density. Foundation preparation involved clearing, grubbing, and removing all topsoil or unsuitable material.

The foundation of the dam consists of residual silts and silty clays mixed with shale and sandstone fragments. These soils overlie firm, weathered silty or sandy shale alternating with thin sandstone layers. The overlying silt and clay soil layer averages about 4 ft. in thickness.

- 2) Seepage Control Provisions. The earthfill cutoff trench is located at the embankment centerline (see Plate No. 2). The trench has a bottom width of 14 ft. and side slopes with 1H:1V inclinations. The trench was excavated to penetrate shale and sandstone strata and varies in depth from 4 to 7 ft. Compacted sandy clay (CL) was used as trench fill.

The seepage drain (see Plate No. 3) is located 30 ft. downstream of the dam centerline and consists of a rectangular interceptor trench, measuring 3 ft. wide and 5 ft. deep, backfilled with silt-sand-gravel filter material. The trench extends up abutment slopes to normal pool level (El. 2,465.6). The seepage drain outlet exits the embankment at the stilling basin. This outlet consists of a trench filled with filter material and a perforated and non-perforated corrugated metal pipe.

- 3) Flood Discharge Facilities. The principal spillway intake structure (see Plate No. 5) is constructed of reinforced concrete and contains low and high stage inlets. One (1) low stage orifice opening, measuring 0.5 ft. high by 2.0 ft. wide, is located at normal pool level (El. 2,465.6) and is protected by a steel trash rack cage. Two (2) high stage riser crest openings are located 3.4 ft. above normal pool level (El. 2,469.0). These openings measure 1.0 ft. high by 6.0 ft. wide.

The top of the intake structure is constructed with a reinforced concrete slab for anti-vortex protection. Steel crosspieces serve as trash racks for the riser crest openings. The intake structure also contains an 8 in. dia. reservoir drain gate valve. An 8 in. dia. cast iron pipe connects the reservoir drain inlet to the gate valve. The inlet consists of a 30 in. dia. perforated corrugated metal pipe section installed vertically on the floor of the reservoir.

A 24. in. dia. reinforced concrete outlet pipe, with concrete cradle and anti-seep collars, is connected to the bottom of the intake structure and discharges into the stilling basin. Two (2) cast in-place concrete piles and reinforced concrete pile bent were used to support the pipe section which exits from the embankment at the stilling basin.

The emergency spillway channel was excavated into silty clay and weathered shale at the right (west) dam abutment. Channel cover consists of topsoil vegetated with grass. The channel is trapezoidal in shape, with a bottom width of 50 ft. and side slopes of 2H:1V. The channel is approximately 450 ft. long with control section located 6.5 ft. below top of dam (El. 2,477.0).

2.2 Construction. Field observation and review of design documents indicate that the dam was constructed in general accordance with the intended design drawings and specifications. No modifications or unusual construction difficulties were reported.

2.3 Operation. The Garrett Soil Conservation District is responsible for the operation of Little Youghiogheny Site No. 2. The discharge of principal and emergency spillways is uncontrolled. The only operational feature is a gate valve used to provide regulation and drawdown of the reservoir. The gate valve was found inoperable at the time of the field reconnaissance.

2.4 Evaluation

- a. Availability. All available design information and drawings were provided by the Dam Safety Division, Maryland Water Resources Administration and the Soil Conservation Service.
- b. Adequacy. The design data provided is reasonably documented and is considered adequate to evaluate the dam and appurtenant structures in accordance with the scope of a Phase 1 study. Based on a review of this data, the dam and appurtenant structures are considered to have been designed in general conformance with accepted engineering practice.
- c. Validity. At this time, there is no observable evidence or reason to question the validity of the available design information and drawings.

SECTION 3 VISUAL OBSERVATIONS

3.1 Findings

- a. General. The on-site reconnaissance of Little Youghiogheny Site No. 2 consisted of:

- 1) Visual observations of the earth embankment, abutments, and emergency spillway structure.
- 2) Visual observation of exposed sections of the concrete principal spillway riser, gate valve mechanisms, and outlet pipe.
- 3) Visual observations of discernible hazardous conditions or safety deficiencies.
- 4) Evaluation of the downstream hazard potential.

Visual surveys were performed during periods when reservoir and tailwater were at normal pool levels.

A visual observation checklist and field sketch are given in Appendix A. Specific observations are illustrated in photographs of Appendix D.

In general, visual observations indicate the dam is marginally maintained based on the inoperable condition of the gate valve and evidence of surficial deficiencies. The dam embankment and emergency spillway are considered to be in good condition at the present time.

The following conditions were observed on the dates of the field reconnaissances.

- b. Embankment

- 1) Surficial. Minor rill erosion is evident on the left (east) dam abutment junction. Several animal burrows are scattered over the upstream and downstream embankment slopes. An eroded footpath extends across the entire length of the dam crest and spillway abutment.
- 2) Seepage. Clear seepage is emanating from the left (east) stream bank of the outlet pipe plunge pool. This seepage has an estimated flow rate of 1 gpm.
- 3) Wet Zones. A wet zone is located at the downstream embankment toe, about 15 ft. right (west) of the principal spillway outlet pipe. This wet zone extends along the embankment toe about 150 ft. and has a surface width of about 60 ft. A wet zone is also located along the

toe of the left (east) emergency spillway side slope. No measurable seepage is associated with this wet zone or the zone located at the toe of the dam.

c. Appurtenant Structures

- 1) Principal Spillway. The 8 in. dia. reservoir drain gate valve is inoperable and in a closed position. A steel stem shaft required to operate the gate valve is sheared in half. In addition, stem guides, attached to the inside wall of the principal spillway riser, are rusted and broken.

There was no evidence of cracking or spalling on exposed concrete riser surfaces. High stage trash racks were free of debris and flow obstructions. However, the low stage trash rack and orifice opening are partially obstructed by tall grass.

- 2) Outlet Works. Minor spalling and cracking was evident on the exposed concrete surfaces of the 24 in. dia. outlet pipe. A cement mortar and black tar is patched over most of these concrete surface blemishes.

A seepage outlet toe drain, located 2 ft. to the right (west) of the outlet pipe, was discharging clear water at the estimated flow rate of 0.5 gpm.

Plunge pool side slopes are steep, unlined, and show evidence of bank erosion. The plunge pool and exit channel were observed free of debris and flow obstructions.

- 3) Emergency Spillway. Spillway channel bottoms and side slopes are vegetated with grass and appear stable. Inlet and outlet spillway channels and control crest are free of debris, woody vegetation, and other obstructions which might restrict flow.

- d. Reservoir Area. Visual observations and a map review indicate reservoir slopes and shoreline are predominately covered with cropland, open pasture, and some woodland. Reservoir slopes and shoreline appear stable, exhibiting no evidence of landslides or significant erosion. Reservoir water and outlet pipe discharge was relatively free of significant turbidity.

- e. Downstream Channel. Immediately downstream of the dam, channel banks of Cherry Glade Run are vegetated with grass and appear stable. Cherry Glade Run flows into the reservoir of Little Youghiogheny Site No. 1 about 1 mile downstream of Site No. 2. U. S. Route 219 and one (1) county road overpass Cherry Glade Run. Between the two dams, approximately thirteen (13) commercial and residential structures are located adjacent to and within a 20 ft. elevation difference of Cherry Glade Run.

3.2 Evaluation

- a. Embankment. The surficial embankment deficiencies and wet zones identified in Section 3.1 are not considered to represent a significant hazard to the dam. However, embankment improvements should be made to backfill animal burrows and repair eroded footpaths. The wet zone located at the embankment toe should be observed periodically as a precautionary measure to determine if seepage conditions are developing.

The clear seepage emanating from the left (east) plunge pool stream bank is believed to originate from a spring. However, flow measurements should be made to monitor any change in condition, or fluctuation with reservoir pool level or ground water conditions. If found necessary, based on these measurements, remedial repairs should be made.

The general condition of the dam embankment is considered to be good.

- b. Appurtenant Structures. The reservoir drain gate valve is inoperable and is judged inadequate in its present condition. The broken stem shaft and guides should be replaced as soon as possible.

Concrete outlet pipe surfaces should be periodically observed for the development of significant cracking and spalling. Remedial repairs should be made as necessary.

SECTION 4 OPERATIONAL FEATURES

- 4.1 Procedure. Reservoir pool level is normally maintained at El. 2,465.6, the level of the uncontrolled low stage orifice of the principal spillway riser. Flood flows are primarily passed by the principal spillway overflow weirs or in combination with the emergency spillway channel.

The only operational feature of the dam is a mechanical gate valve used to lower or drain the reservoir pool. The gate valve is infrequently operated and is normally closed.

- 4.2 Maintenance of Dam. The dam facility is maintained by the Garrett Soil Conservation District. According to local Soil Conservation Service officials, maintenance usually consists of cutting grass, removing brush from embankment slopes, liming and fertilizing slopes, removing trash from dam premises, and clearing debris from the trash racks. Maintenance is reportedly performed on an annual basis.
- 4.3 Inspection of Dam. Operation and maintenance inspections are usually performed by the Soil Conservation Service, on an annual basis. These inspections are performed at the request of the Garrett Soil Conservation District. Inspections generally consist of visually examining the dam embankment, appurtenant structures, reservoir area, and outlet channel, and providing repair recommendations.
- 4.4 Maintenance of Operating Facilities. There is no record of how often the gate valve operating mechanisms are maintained and exercised. However, at the time of the field reconnaissance, the gate valve stem shaft and guides were broken. Hence, the gate valve could not be operated.
- 4.5 Warning Systems in Effect. There is no warning system or formal emergency procedure to alert or evacuate, as necessary, downstream residents in the event or threat of a dam failure.
- 4.6 Evaluation. In general, maintenance procedures at Little Youghiogheny Site No. 2 are considered marginal. Inspection and necessary repair of the reservoir drain gate valve should be performed as needed. A formal flood surveillance and warning plan is needed for the protection of downstream residents.

SECTION 5 HYDROLOGY/HYDRAULICS

5.1 Evaluation of Features

- a. Design Data. Little Youghiogheny Site No. 2 was designed for the purpose of flood control. The watershed has an area of 305 acres and ranges in relief from 2,465.6 to 2,680 ft. A weighted curve number (CN) of 76, for antecedent moisture condition II, was used to define the watershed cover complex. Watershed cover consists predominately of pasture and cultivated land.

The hydrologic/hydraulic analyses contained in the design report were reviewed and found in accordance with accepted engineering practice.

Soil Conservation Service "high" hazard (Class C) and Maryland State design storm criteria were used to evaluate emergency spillway and dam height requirements. Estimated fifty year sediment accumulation of 17.4 ac.-ft. was used to set normal pool level (El. 2,465.6). This level is controlled by passage of normal base flow through the low stage principal spillway orifice.

The principal spillway was designed to pass a 100 year frequency, 6 hour duration design storm without activating the emergency spillway. Rainfall of 4.8 in./6 hr. was used to analyze this condition. Flood routing calculations indicate a minimum emergency spillway crest elevation of 2,476.3 ft. for this rainfall amount. The emergency spillway crest was accordingly set at El. 2,477.0.

Design high water conditions, based on rainfall of 10.8 in./6 hr., were used for design of the emergency spillway channel. Based on this design rainfall, a peak reservoir elevation of 2,479.6 ft. (3.9 ft. below top of dam) and a maximum channel flow velocity of 6.4 fps would reportedly occur.

Top of dam determination was based on a design rainfall of 27.0 in./6 hr. (22.7 in. runoff). Flood routing calculations indicate peak outflow of 2,720 cfs and a maximum reservoir elevation of 2,483.5 ft. for this rainfall amount. Top of dam was accordingly set at El. 2,483.5.

- b. Experience Data. No records of reservoir levels or rainfall amounts are kept. The storm of record for this area occurred in March 1936. Design calculations indicate that runoff from this storm (6.1 in./48 hr.) would result in a maximum reservoir level 12 ft. below top of dam. There is no record of the emergency spillway ever being activated during periods of heavy rainfall.

- c. Visual Observations. No serious appurtenant structure deficiencies were noted during the visual inspections. The inoperable reservoir drain does not reduce the discharge capacity of the principal spillway.
- d. Overtopping Potential. The Corps of Engineers' guidelines recommends design storms of $\frac{1}{2}$ PMF to PMF (Probable Maximum Flood) for "small" size, "high" hazard dams. According to Hydrometeorological Report No. 33, the rainfall amounts for these design storms, adjusted for watershed area, are 10.7 in./6 hr. and 21.4 in./6 hr., respectively. (See Appendix C.) Top of dam elevation was based on design rainfall of 27.0 in./6 hr. The dam can therefore accommodate 100% PMF runoff without being overtopped.
- e. Emergency Spillway Adequacy. Design calculations indicate that the emergency spillway will have peak discharge values of 450 cfs for design high water conditions (10.8 in./6 hr. rainfall) and 2,650 cfs at top of dam (27.0 in./6 hr. rainfall). PMF rainfall of 21.4 in./6 hr. is the maximum amount recommended by guideline criteria. The spillway can discharge 100% of the PMF runoff and is therefore considered adequate.
- f. Downstream Conditions. Approximately 1 mile downstream of Little Youghioghenny Site No. 2, Cherry Glade Run flows into the reservoir of Little Youghioghenny Site No. 1. Between these two dams, U. S. Route 219 and one (1) county road overpass Cherry Glade Run. Approximately thirteen (13) commercial and residential structures are located adjacent to and within a 20 ft. elevation difference of Cherry Glade Run.

Cherry Glade Run joins Wilson Run about 500 ft. downstream of Little Youghioghenny Site No. 1. Wilson Run traverses the south and west central downtown sections of Oakland before merging with the Little Youghioghenny River. The estimated Wilson Run floodplain includes at least sixteen (16) commercial and residential structures.

SECTION 6 STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

- a. Visual Observations. As indicated in Section 3.2, visual field observations did not reveal evidence of structural distress or deficiencies that would significantly affect the stability of the dam embankment or appurtenant structures at this time. However, the observed seepage located at the left (east) stream bank of the outlet plunge pool should be monitored for increase in flow or areal extent, and for development of internal erosion conditions. Measurements should be made to determine if seepage flow is affected by changes in reservoir pool level or ground water conditions.

b. Design and Construction Data

- 1) Subsurface Exploration. Fifteen (15) test pits were excavated at dam centerline and borrow areas. (Refer to Plate No. 2.) Soil samples obtained from test pit excavations indicate dam foundation soils consist predominately of residual silts and silty clays mixed with shale and sandstone fragments. These soils are underlain by silty or sandy shales alternating with thin sandstones. The soil mantle reportedly averages about 4 ft. in thickness.

Ground water was encountered in an alluvial clayey gravel at El. 2,452.0 at one test pit location.

- 2) Laboratory Testing. Classification, compacted dry density, and a remolded triaxial shear test were performed on select soil samples obtained from test pit excavations.

Classification test results indicate foundation and borrow soils are predominately clayey and silty gravels (GC, GM) with low to moderate plasticity. Compacted dry densities, corrected for gravel content, ranged from 110.0 pcf to 115.5 pcf. One (1) consolidated undrained triaxial shear test was performed on a clay (CL) soil specimen compacted to 95 percent of Standard Proctor density. A shear strength of $\phi = 21.5^\circ$ and $c = 2,000$ psf was obtained.

- 3) Slope Stability and Seepage Analysis. No calculations or references were found in the design report to indicate slope stability or seepage analyses were performed.

- c. Operating Records. The dam operates as an uncontrolled structure. Records are not maintained of gate valve operation.
- d. Post-Construction Changes. There are no reports of post-construction changes made at this dam facility.

- e. Seismic Stability. Based on visual observations and the past performance history of the dam, the static stability of the embankment slopes is considered to be adequate.

According to guideline criteria, Little Youghiogheny Site No. 2 is located in a Seismic Zone 1 area (low seismic probability). Based on this low seismic probability and recommended criteria for the evaluation of seismic stability of dams, the seismic stability of the dam structure is presumed to be adequate under these earthquake conditions.

SECTION 7
ASSESSMENT, RECOMMENDATIONS/PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Evaluation

- 1) Embankment and Emergency Spillway. The seepage emanating from the left (east) stream bank of the outlet plunge pool is not considered to represent a significant hazard to the dam at this time. However, the seepage flow should be periodically measured and observed for evidence of internal erosion and change in condition.

Wet zones located at the toe of the dam and spillway side slope are not considered significant. However, the wet zone located at the toe of the dam should be periodically observed as a precautionary measure.

In general, the embankment and emergency spillway are considered to be in good condition at the present time. This conclusion is based on the reported excellent performance history of the dam and spillway and the absence of discernible distress that would significantly affect the overall performance or stability of these structures.

- 2) Principal Spillway Riser. The principal spillway riser is considered to be structurally adequate and in good condition. However, the reservoir drain gate valve, housed in the riser, is inoperable and is judged inadequate in its present condition. Immediate repairs should be made.
- 3) Flood Discharge Capacity. The hydrological/hydraulic design computations reviewed in this study indicate the dam can pass the PMF (100%), the required spillway design flood, without overtopping the dam embankment. The spillway system is therefore considered adequate and in accordance with recommended criteria.

- b. Adequacy of Information. The design information and drawings available for this review were of sufficient detail to adequately conduct a Phase 1 study.
- c. Necessity for Additional Data. No additional data is considered required at this time.
- d. Urgency. The following recommendations should be implemented as soon as possible.

7.2 Recommendations/Remedial Measures. The following recommendations are presented based on the data obtained:

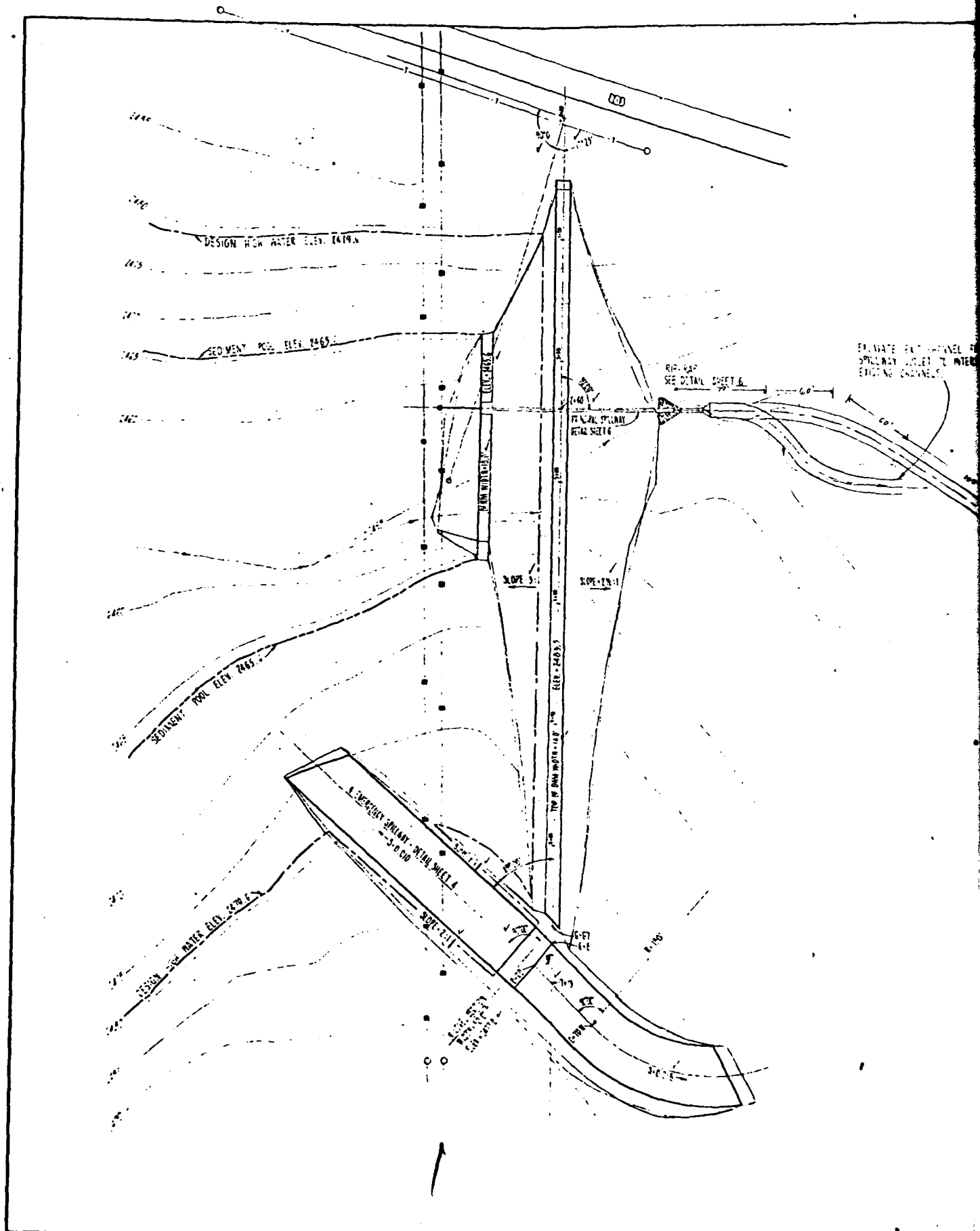
a. Dam and Appurtenant Structures

- 1) Monitor seepage emanating from the left (east) stream bank of the outlet plunge pool. Monitoring should consist of periodically measuring seepage flow to determine any change in condition, or fluctuation with reservoir pool level, or ground water conditions. If found necessary, based on these measurements, remedial repairs should be performed.
- 2) Maintain gate valve and replace stem shaft and guides.
- 3) Remove grass obstructing low stage orifice opening.
- 4) Repair rill erosion and footpaths, and backfill animal burrow holes.

b. Operation and Maintenance Procedures

- 1) Develop a formal flood surveillance and warning plan. Plan to include, but not limited to, the following:
 - (a) Surveillance. Around-the-clock surveillance of the dam embankment, reservoir levels, and spillway channel during periods of unusually heavy rainfall.
 - (b) Warning System. Formal warning procedures to alert downstream residents in the event of expected high flood flows.
 - (c) Evacuation Plans. Adequate emergency contingency plans to evacuate downstream residents in the event or threat of a dam failure.
- 2) Develop a more thorough and active maintenance and inspection program at the dam facility. Program should include:
 - (a) Frequent maintenance and exercising of the reservoir drain gate valve.
 - (b) Observation of wet zone located at toe of dam for development of seepage conditions.
 - (c) Observation of outlet pipe (end section) concrete surfaces for the development of significant cracking and spalling. Remedial repairs should be made as necessary.

PLATES



EMERGENCY SPILLWAY CURVE DATA

P = 150'
 Δ = 48°
 D = 33° 11' 50"
 L = 25.66'
 T = 66.78'
 E = 14.20'

M = 17.91'
 L.C. = 101.02'
 P.C. = 0+70.6
 P.T. = 1+25.78 M
 P.T. = 1+95.66 R

| TANGENT DIST. | OFFSET |
|---------------|--------|
| 25' | 1.34' |
| 40' | 5.43' |
| 60' | 12.52' |
| 80' | 23.11' |
| 100' | 38.20' |
| 111.47' | 49.65' |

LEGEND

| | |
|-----------------------------|-----------------|
| TRAVERSE LINE | --- |
| CONTOUR LINES | --- 54.70 --- |
| STREAM | --->--->--- |
| DESIGN HIGH WATER | --- |
| SEDIMENT POOL ELEV. | --- |
| PROPOSED IMPROVEMENTS | --- |
| TELEGRAPH & TELEPHONE LINES | --- T --- T --- |
| POWER TRANSMISSION LINES | --- ● --- ● --- |
| WATER DISTRIBUTION LINES | --- S --- S --- |
| PROPERTY LINES | --- P --- P --- |
| U.S. HIGHWAY | --- (275) --- |

ERUATE EXT. CHANNEL FROM PRINCIPAL
 SPILLWAY OUTLET TO INTERSECT WITH
 EXISTING CHANNELS.

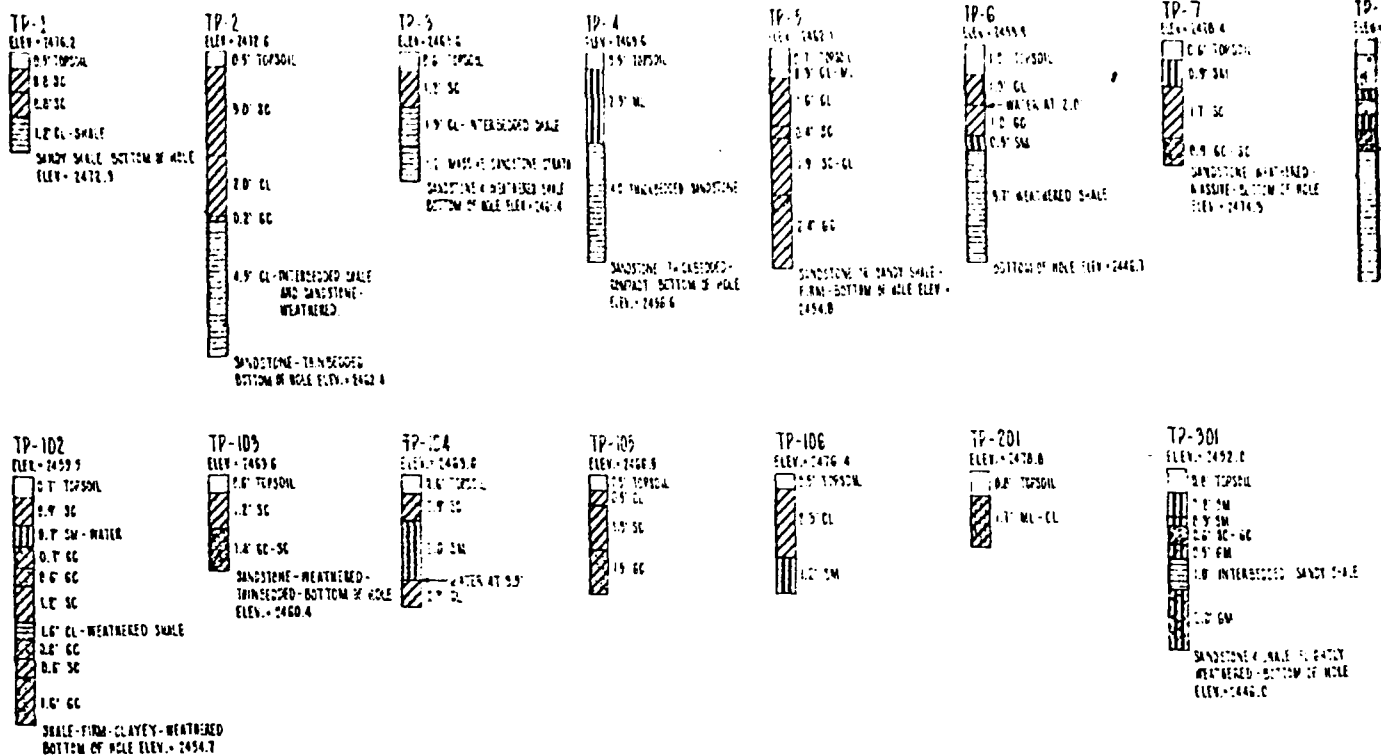
RIP-RAP
 SEE DETAIL SHEET 6

AS BUILT

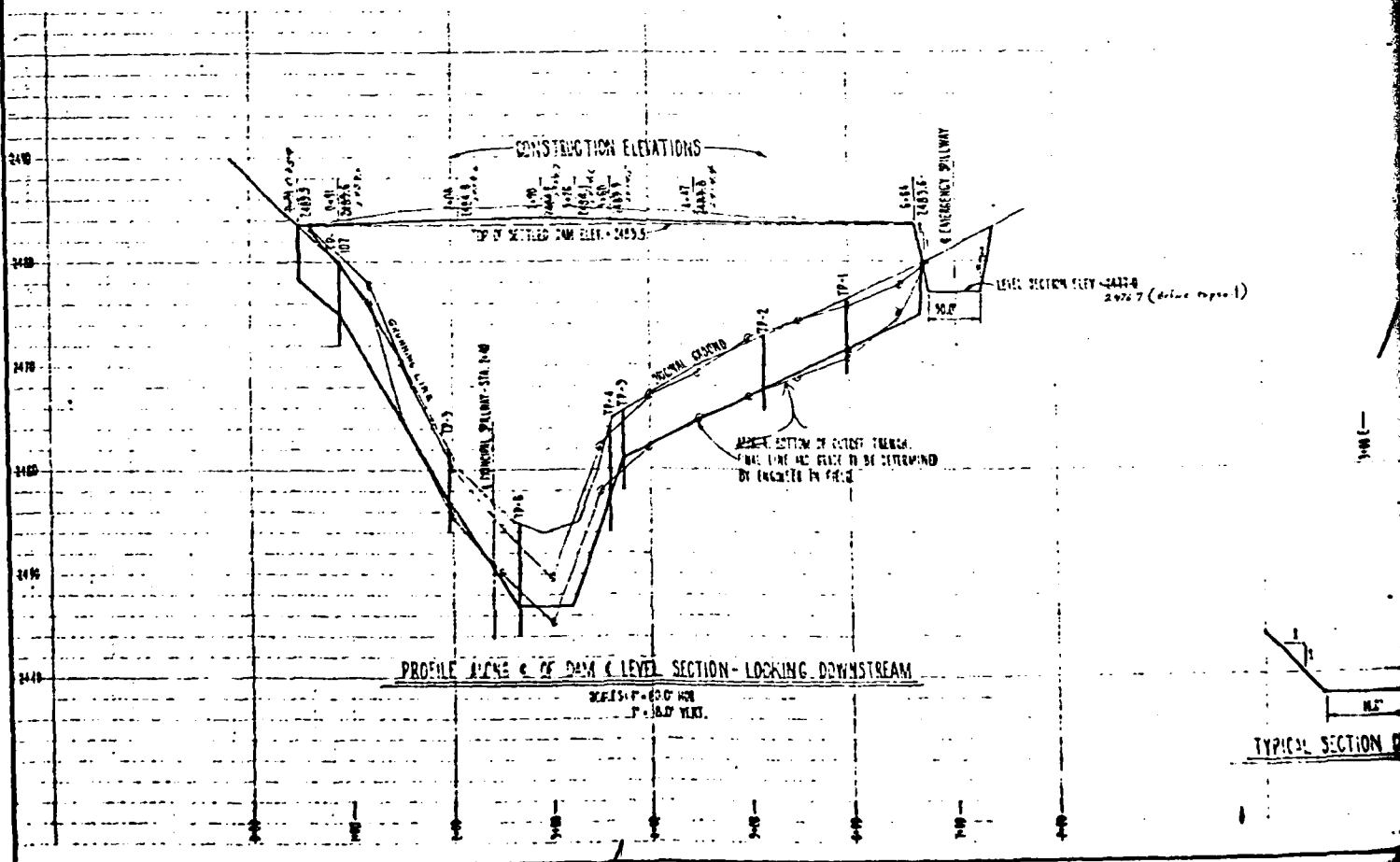
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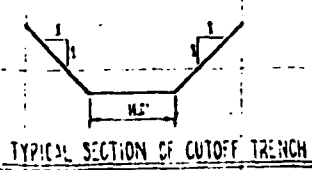
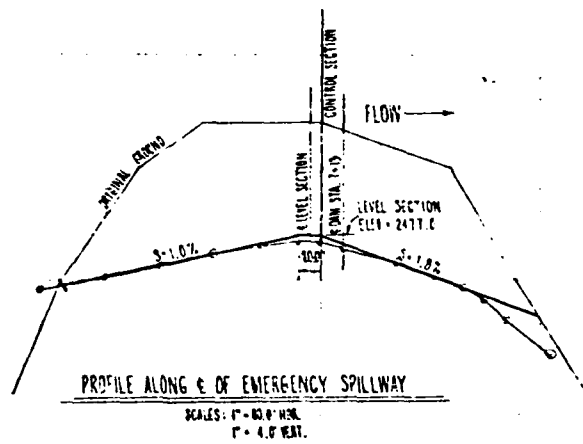
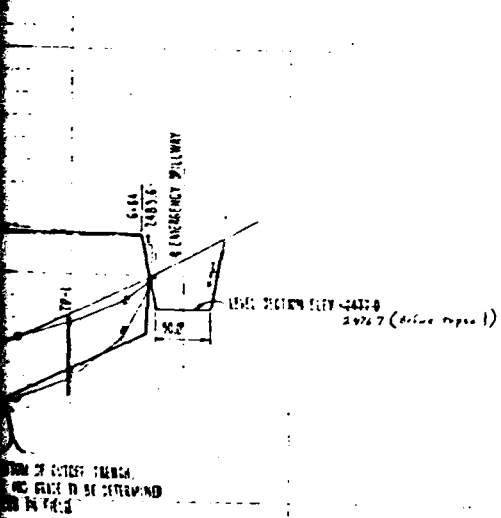
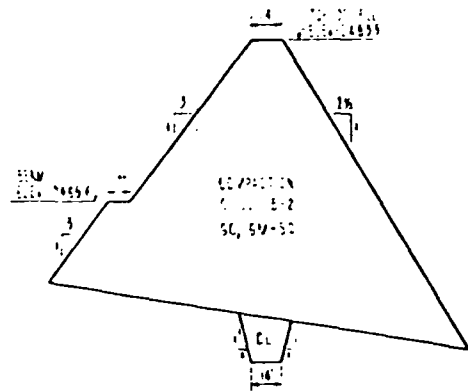
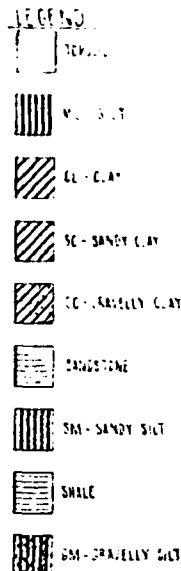
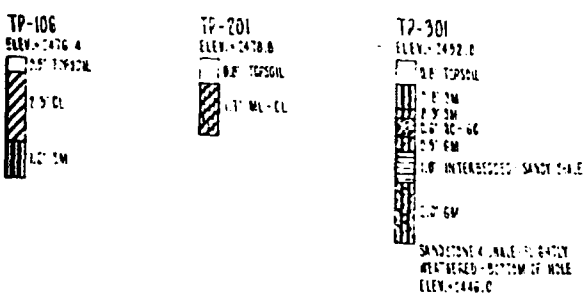
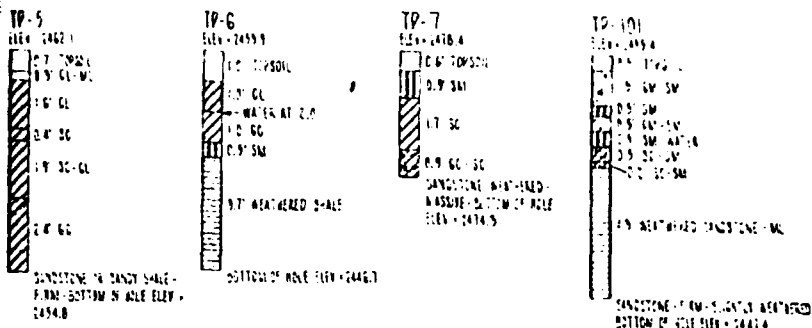
| | |
|---|--|
| DRAINAGE LITTLE ROCK-OGDEN DRAINAGE DISTRICT PROJECT SITE NO. 1 (CROCKET COUNTY, MISSOURI) | |
| U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE | |
| Checked by D. S. BROWN District Engineer Little Rock, Ark. Date 10/1/55 | Approved by _____ District Engineer Date 10/1/55 |
| Drawn by J. L. COTTON District Engineer Date 10/1/55 | Project No. 40-405-P |

PLATE NO. 1



GEOLOGIC INVESTIGATION DATES: MARCH 1960 FOR TEST PITS 104-105-106-201
APRIL 1956 FOR TEST PITS 1-2-3-4-5-6-7-301

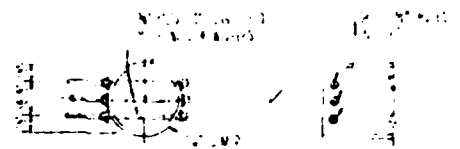




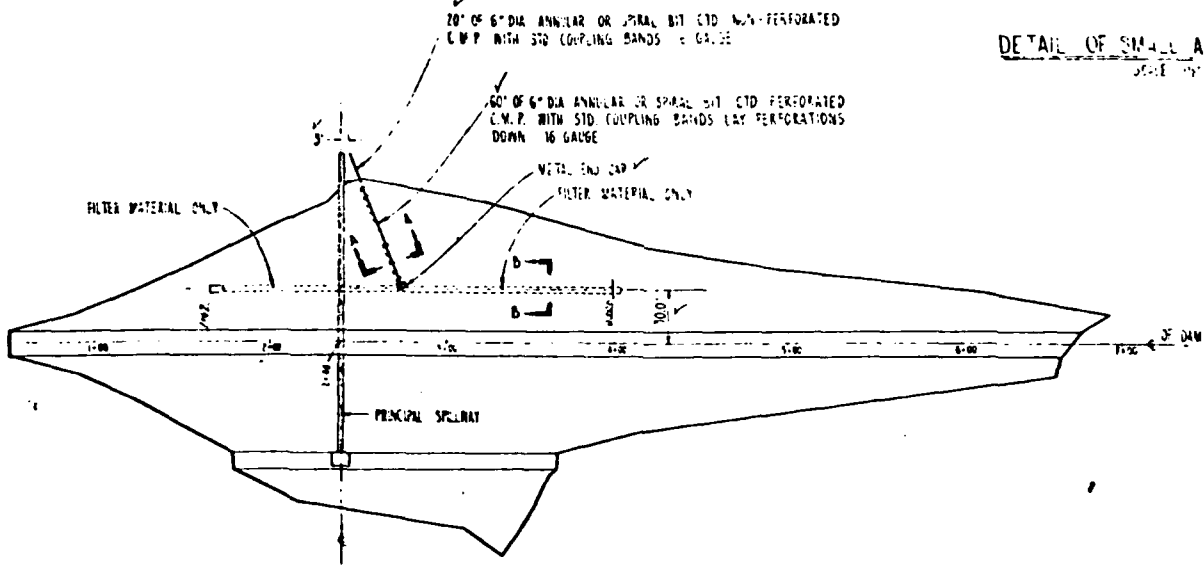
AS BUILT

| | |
|--|--|
| GEOLOGIC PROFILE 3 - TYPICAL SECTION OF FILL | |
| LITTLE ROCK-OSAGE RIVER WATERED PROTECTION PROJECT SITE NO. 1 GARRETT COUNTY, MARYLAND | |
| U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE | |
| Checked by: J. B. STANLEY Drawn by: J. B. STANLEY Project: 10-100-1000 Date: 10-10-60 | Approved by: _____ Date: 10-10-60 Project: 10-100-1000 |
| Plate No. 2 MD-409-P | |

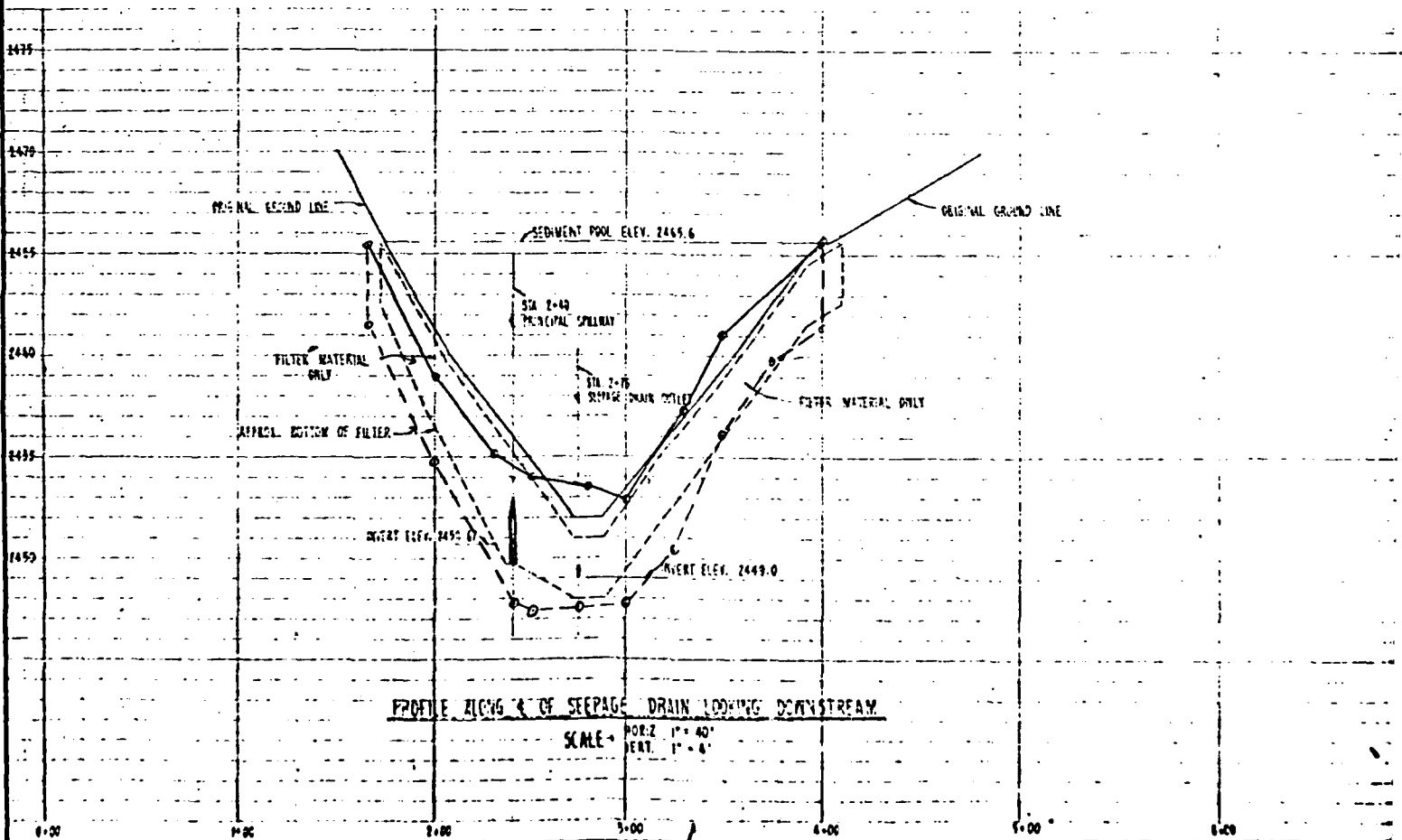
NOTE: FINAL LINE AND GRADE OF FILTER TO BE DETERMINED BY ENGINEER IN FIELD.



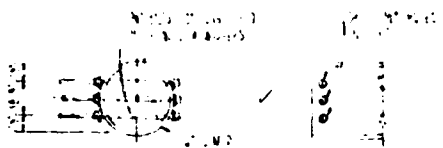
DETAIL OF SMALL AREA C-30
SCALE: 1" = 4'



PLAN VIEW OF SEEPAGE DRAIN
SCALE: 1" = 50'

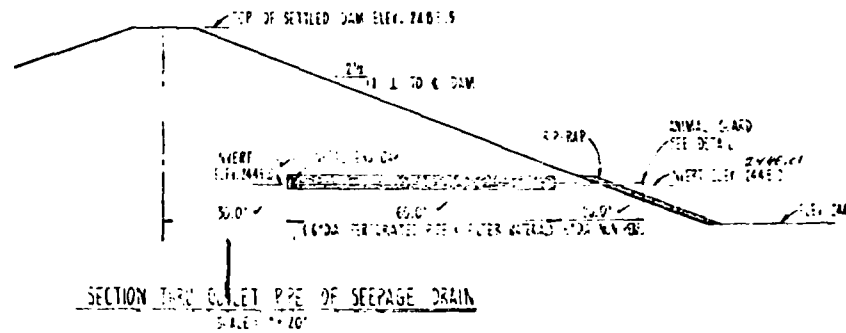


PROFILE ALONG A OF SEEPAGE DRAIN LOOKING DOWNSTREAM
SCALE: HORIZ. 1" = 40'
VERT. 1" = 4'

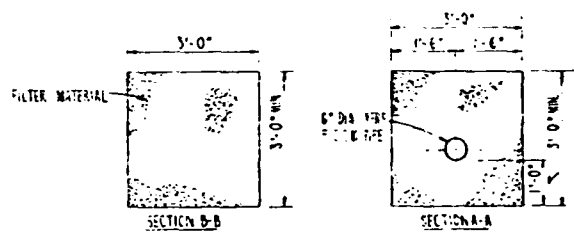
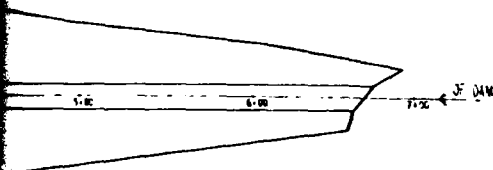


DETAIL OF SMALL AREA (C-D)
SCALE 1" = 10'

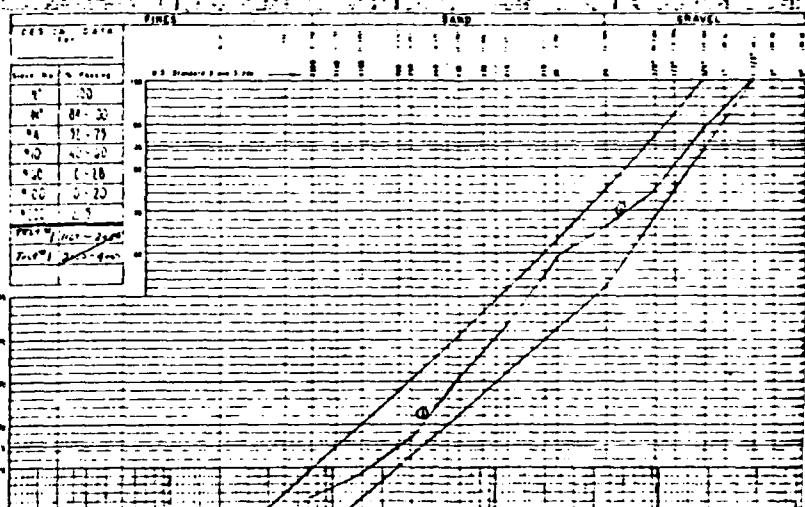
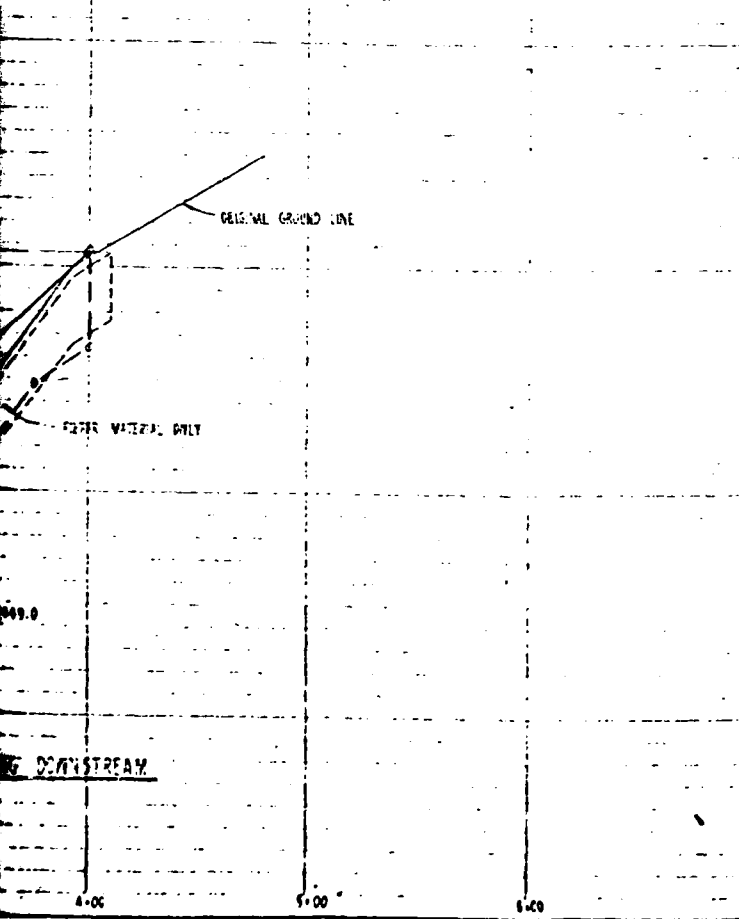
NON-PERFORATED
PIPE
1/2" CTD PERFORATED
LAYER PERFORATIONS



SECTION THROUGH OUTLET PIPE OF SEEPAGE DRAIN
SCALE 1" = 10'



TYPICAL SECTIONS OF SEEPAGE DRAIN - SCALE 1" = 1'



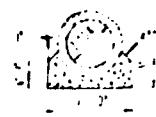
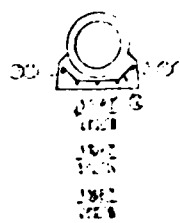
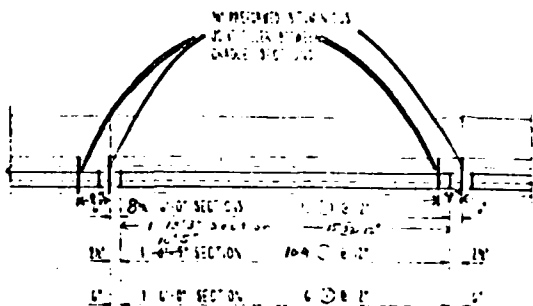
AS BUILT

SEEPAGE DRAIN DETAILS
LITTLE ROCK DAM
ANTHONY PROTECTION PROJECT SITE NO. 1
GARRET COUNTY, MONTANA

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

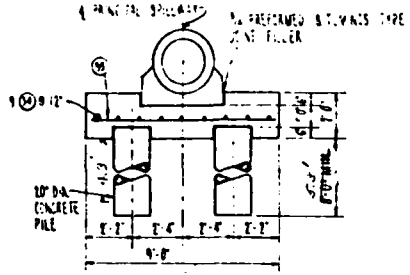
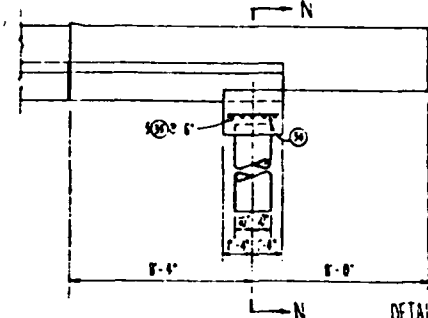
| | | |
|-----------------------------|----------------------------|----------------------------|
| Designed by J. S. HARRIS | Checked by J. S. HARRIS | Approved by [Signature] |
| Drawn by J. S. HARRIS | Traced by J. S. HARRIS | Date [Date] |
| Scale 1" = 10' | Sheet 1 of 1 | Project VO-455-P |

PLATE NO. 3



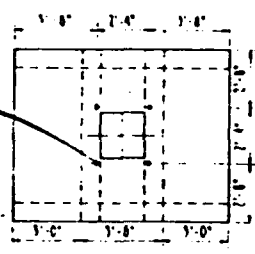
STEEL
CONCRETE

STRUCTURAL & STEEL DETAILS OF CRADLE

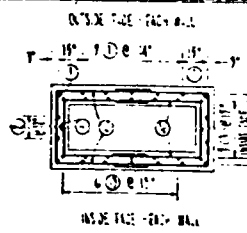


DETAIL OF CANTILEVER OUTLET FOR PRINCIPAL SPILLWAY

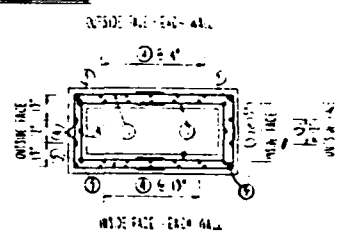
REINFORCED CONCRETE
DETAIL SHEET



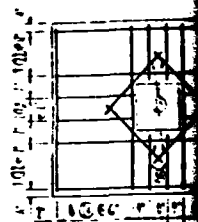
PLAN



SECTION E-E

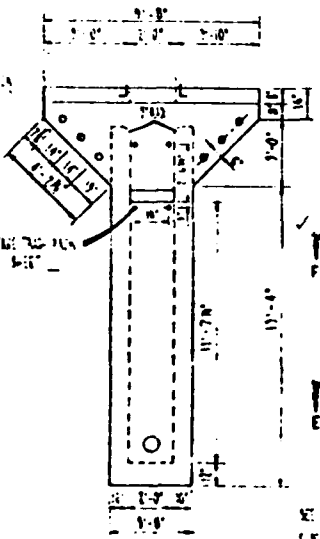


SECTION F-F

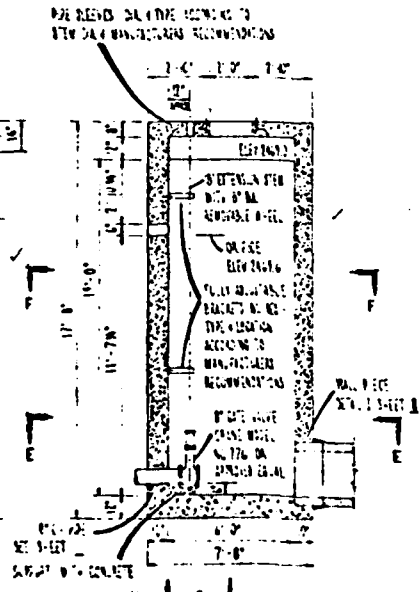


PLAN

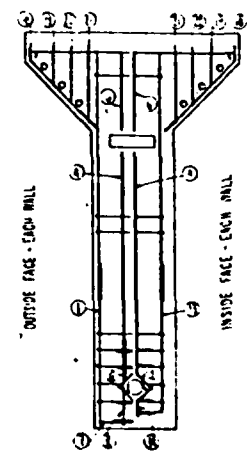
REINFORCED CONCRETE
DETAIL SHEET



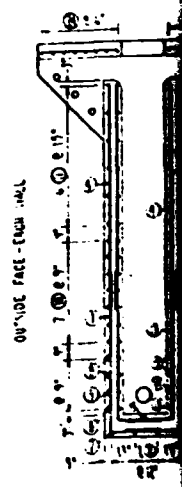
UPSTREAM ELEVATION



SECTION ON CENTERLINE



SECTION H-H



SECTION I-I

STRUCTURAL & STEEL DETAILS OF REINFORCED CONCRETE RISER

| | |
|------|-------|
| 12.6 | 06.07 |
| 12.6 | 06.07 |
| 12.6 | 06.07 |

- 3 ALL CONCRETE SHALL BE CLASS 4000 AT THE TYPE NOTED
- 4 FORMS AND REINFT. TYPE IS AS TYPE 2 WITH 16" X 4" X 10' X 10' ADVANTAGE SHALL BE USED.
- 5 ALL REINFORCING STEEL SHALL BE LAPPED A MIN. OF 30 DIA.
- 6 ALL REINFORCING STEEL PLACED IN CONCRETE POWRED AGAINST THE SILLING SHALL HAVE 2" OF 1" CLEAR COVER. WHERE FORMS ARE USED ALL BARS SHALL HAVE A MIN. OF 1" CLEAR COVER.
- 7 ALL EXPOSED EDGES OF CONCRETE TO HAVE A 1" MIN. CHAMFER FINISH SUCCESS OTHERWISE NOTED.

[illegible]

10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846.

M-N
P.E.C. 242 SPILLWAY

ATD: 44-388-444

Technical drawing of a rectangular box. The drawing shows a perspective view of the box with a lid. Dimensions are indicated: the top edge of the lid is labeled "10 1/2\"", the front edge of the lid is labeled "10 1/2\"", and the front edge of the box body is labeled "10 1/2\"". The side of the box is labeled "10 1/2\"". The bottom edge of the box is labeled "10 1/2\"". The drawing is labeled "ONE OF THE BOXES" and "ONE OF THE BOXES" on the right side.

MUSE PAGE - END

SECTION F-F

PLAN

SECTION H-H

SECTION G-G

DETAILS OF REINFORCED CONCRETE ANTI-SEEP COLLAR

SCALE 1"=1'-0" **AS BUILT**

STRUCTURAL & FOUNDATION STEEL DETAILS
LITTLE (000-00000)

INTERVIEW REPORT ON SUBJECT S. W. L.
GARRETT COUNTY, MARYLAND

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

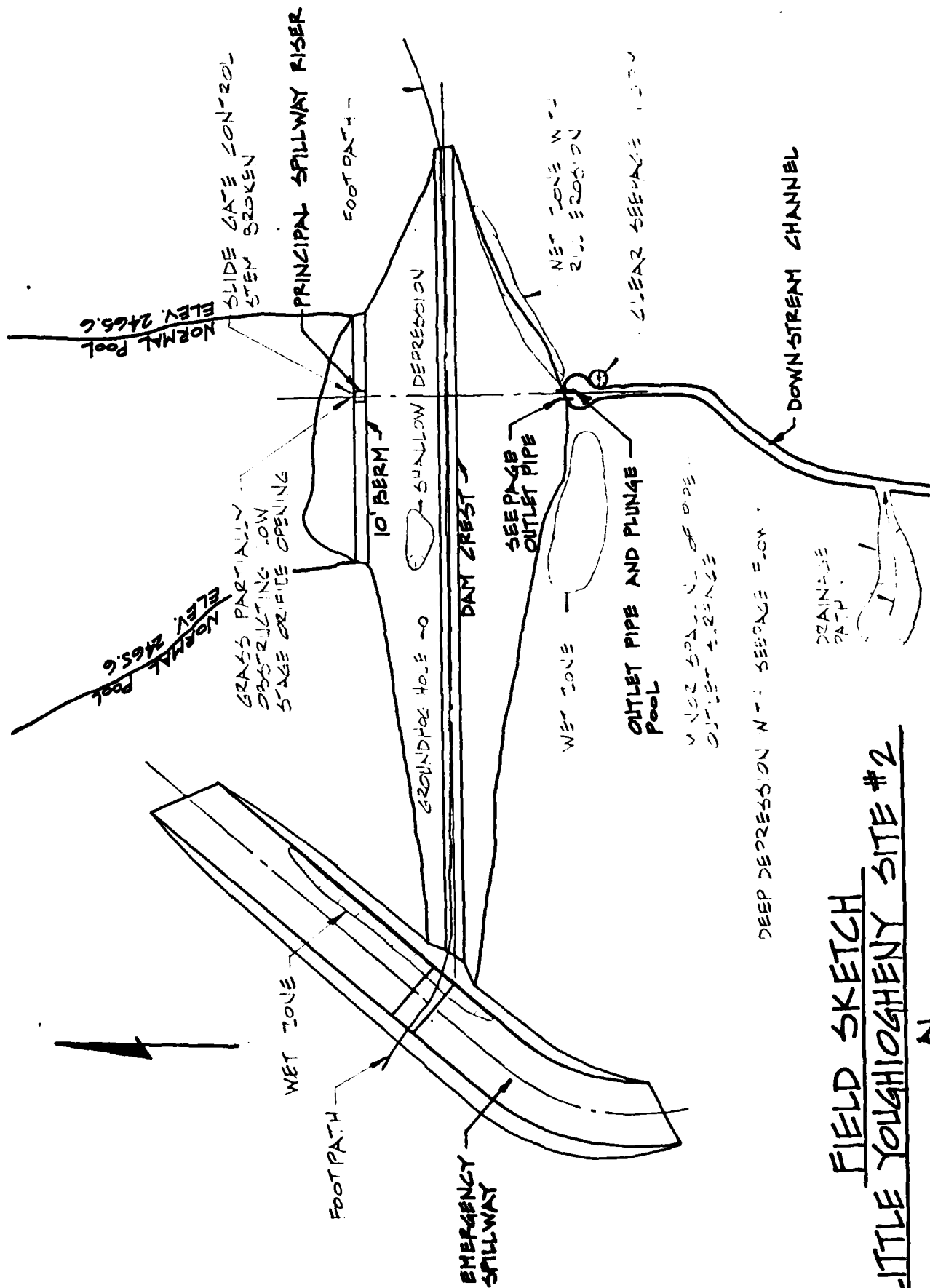
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| Date: 10-1-68 Time: 10:00 From: 100-405-P To: 100-405-P Subject: 100-405-P | Approved By: [Signature] Title: [Signature] Date: 10-1-68 Time: 10:00 From: 100-405-P To: 100-405-P Subject: 100-405-P |
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REINFORCED CONCRETE RISER

PLATE NO. 5

Form SCS 313 November 1966

APPENDIX A
FIELD SKETCH AND VISUAL OBSERVATIONS CHECKLIST



FIELD SKETCH
LITTLE YOUGHIOGHENY SITE #2
NI

VISUAL OBSERVATION CHECKLIST

Name Dam Little Youghiogheny County Garrett State Maryland National ID # MD 33
 Site No. 2
 Type of Dam Earthfill Hazard Category High, Class I
 Date(s) Inspection 4/11/79 Weather Clear, cool Temperature 60° F
 Inspection Review Date 5/24/79 (Ackenheil & Associates personnel only.)
 Pool Elevation at Time of Inspection 2,465.6* Tailwater at Time of Inspection Normal M.S.
 *Pool at riser orifice elevation

Inspection Personnel:

Ackenheil & Associates

Timothy E. Debes
 James D. Hainley
 Michael McCarthy

Water Resources Admin.

Jeffrey Smith
 Thomas Moynahan

Soil Conservation Service

Bill DeBarry
 Walt Payte
 John Reckner
 Shaun Sanders

Recorder Timothy E. Debes

EMBANKMENT

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS* |
|--|----------------|--|
| SURFACE CRACKS | None observed. | |
| UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE | None observed. | |
| SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES | | Minor rill erosion on left dam abutment junction. Several animal burrows located on upstream and downstream embankment slopes. |
| VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST | | No vertical or horizontal misalignment noted. |
| RIPRAP FAILURES | N/A | |

*REFER TO REPORT SECTIONS 3 AND 7

EMBANKMENT

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|----------------------------|
| SETTLEMENT | None evident. | |
| JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM | Left dam abutment junction saturated and soft in consistency. However, the junction is protected with a dense grass cover. | |
| ANY NOTICEABLE SEEPAGE | Clear seepage emanating from left (east) bank of plunge pool (about 1 gpm). Wet zones were found located at the embankment toe (right (west) of the plunge pool) and about 300 ft. downstream of the dam. No measurable seepage is associated with the embankment toe wet zone. However, the downstream wet zone and depression is associated with spring flow (10 - 15 gpm). | |
| STAFF GAGE AND RECORDER | None. | |
| DRAINS | A 6 in. dia. seepage outlet toe drain exits the dam embankment on the right (west) side of the concrete outlet pipe. Seepage flow was estimated at the rate of 0.5 gpm, accompanied by a brown precipitate. | |

OUTLET WORKS

(Pond Drain)

| <u>VISUAL EXAMINATION OF</u> | <u>OBSERVATIONS</u> | <u>REMARKS OR RECOMMENDATIONS</u> |
|--|---|-----------------------------------|
| CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT | Minor evidence of concrete spalling and cracking was observed on exposed outlet pipe surfaces. The pipe outlet end section was patched with a concrete mortar and black tar. | |
| INTAKE STRUCTURE | Grass is obstructing the low stage orifice of the principal spillway riser. Concrete riser surfaces in good condition, no spalling or cracking evident. Fish screen removed from the right (west) high stage weir crest opening. Gate valve not operable. Control stem shaft and guides broken. | |
| OUTLET STRUCTURE | N/A | |
| OUTLET CHANNEL | Plunge pool banks steep but stable. However, minor slope erosion was observed on plunge pool banks. Exit stream channel is cobble lined with stable side slopes. | |
| EMERGENCY GATE | N/A | |

UNGATED SPILLWAY

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|-----------------------|--|----------------------------|
| CONCRETE WEIR | N/A | |
| APPROACH CHANNEL | Spillway approach channel cut into natural earth. Channel bottom and side slopes are vegetated with grass and appear stable. No flow obstructions evident. A wet zone extends along toe of east spillway side slope (about 350 ft. in length). | |
| DISCHARGE CHANNEL | Downstream spillway channel discharges into an open meadow in a general direction leading to Cherry Glade Run. | |
| BRIDGE AND PIERS | N/A | |

GATED SPILLWAY

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|----------------------------------|--------------|----------------------------|
| CONCRETE SILL | N/A | |
| APPROACH CHANNEL | N/A | |
| DISCHARGE CHANNEL | N/A | |
| BRIDGE AND PIERS | N/A | |
| GATES AND OPERATION EQUIPMENT | N/A | |

INSTRUMENTATION

| <u>VISUAL EXAMINATION OF</u> | <u>OBSERVATIONS</u> | <u>REMARKS OR RECOMMENDATIONS</u> |
|------------------------------|---------------------|-----------------------------------|
| MONUMENTATION/SURVEYS | None. | |
| OBSERVATION WELLS | None. | |
| WEIRS | None. | |
| PIEZOMETERS | None. | |
| OTHER | N/A | |

RESERVOIR

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|-----------------------|--|----------------------------|
| SLOPES | Reservoir slopes covered primarily by cropland, open pasture and some woodland. Reservoir slopes and shoreline stable. | |
| SEDIMENTATION | No significant evidence of sedimentation visible. Reservoir water and outlet pipe discharge observed clear. | |

DOWNSTREAM CHANNEL

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|--|----------------------------|
| CONDITION (OBSTRUCTIONS, DEBRIS, ETC.) | Channel banks are vegetated with grass and appear stable. No channel flow obstructions observed. | |
| SLOPES | Channel stream banks and slopes are vegetated and appear stable. | |
| APPROXIMATE NO. OF HOMES AND POPULATION | Approximately thirteen (13) commercial and residential structures are located adjacent to and within a 20 ft. elevation difference of Cherry Glade Run. The estimated floodplain for Wilson Run includes at least sixteen (16) structures. | |

APPENDIX B

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1

NAME OF DAM
Little Youghiogheny
Site No. 2

ID # MD 33

| ITEM | REMARKS |
|---|---|
| AS-BUILT DRAWINGS | As-built drawings available from Soil Conservation Service. See Plate Nos. 1 through 5. |
| REGIONAL VICINITY MAP | See Appendix E. U.S.G.S. 7.5 minute quadrangle map showing dam site location. Regional vicinity map also included with as-built drawings. |
| CONSTRUCTION HISTORY | Dam designed and constructed under the direction of the Soil Conservation Service between 1960 and 1961. |
| TYPICAL SECTIONS OF DAM | See Plate Nos. 1, 2, 3, and 4 for details of dam embankment. |
| OUTLETS - PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS | See Plate Nos. 4 and 5 for details of principal spillway riser and outlet pipe. Available in design report. |
| RAINFALL/RESERVOIR RECORDS | None available. |

| ITEM | REMARKS |
|---|---|
| DESIGN REPORTS | Little Youghiogheny Watershed Protection Project Site No. 2, Garrett County, Maryland, MD-405, design report prepared by Soil Conservation Service, April 1960. Report may be obtained from Soil Conservation Service or the Maryland Water Resources Administration. |
| GEOLOGY REPORTS | Brief geology report included in the above identified document. Report prepared by R. Fonner, geologist, April 28, 1960. |
| DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES | Soil Conservation Service design report includes hydrology computational summaries, stage storage, and hydraulic discharge rating curves. Dam stability and seepage studies were not included in the design report. |
| MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD | Design report includes logs of test pit excavations and hand auger holes. Laboratory classification, compacted dry density, and shear strength test data are also included. |
| POST-CONSTRUCTION SURVEYS OF DAM | None reported. |
| BORROW SOURCES | Borrow was obtained from excavation of emergency spillway channel and floodplain soils located upstream and downstream of the dam. |

| ITEM | REMARKS |
|---|--|
| MONITORING SYSTEMS | None. |
| MODIFICATIONS | A clay blanket seal was constructed over the shale bedrock located at the spillway-dam abutment area for the purpose of reducing seepage flow through the shale. |
| HIGH POOL RECORDS | None recorded. |
| POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS | None reported. |
| PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS | None reported. |
| MAINTENANCE OPERATION RECORDS | Annual maintenance and operation inspection reports available from Soil Conservation Service district office in Oakland, Maryland. |

| ITEM | REMARKS |
|--|--|
| SPILLWAY PLAN | See Plate Nos. 1, 2, and 3 for details. Spillway design calculations included in Soil Conservation Service design report. |
| SECTIONS | |
| DETAILS | |
| OPERATING EQUIPMENT PLANS & DETAILS | None available. |
| SPECIFICATIONS | Construction Specifications Little Youghiogheny Watershed Site No. 2, prepared by the Soil Conservation Service available with design report. |
| MISCELLANEOUS | Maryland State Waterway Obstruction Permit, dated May 12, 1960. |

APPENDIX C

HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA
AND CALCULATIONS

HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Approximately 70% pasture, 20% cultivated,
10% woodlands.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 2,465.6 ft. (17.4 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 2,483.5 ft. (222 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: 2,479.6 ft.

ELEVATION TOP DAM: 2,483.5 ft.

EMERGENCY SPILLWAY

| | | |
|----|--------------------------|---------------------------------------|
| a. | Elevation | <u>2,477.0 ft.</u> |
| b. | Type | <u>Trapezoidal open earth channel</u> |
| c. | Width | <u>50.0 ft.</u> |
| d. | Length | <u>450.0 ft., curved</u> |
| e. | Location Spillover | <u>Right (west) abutment</u> |
| f. | Number and Type of Gates | <u>None</u> |

OUTLET WORKS

| | | |
|----|-------------------------------|--|
| a. | Type | <u>Reinforced concrete intake structure with 24 in. dia. R.C. outlet pipe.</u> |
| b. | Location | <u>470 ft. east of right (west) abutment and spillway channel</u> |
| c. | Entrance Inverts | <u>Low stage, 2,465.6; High stage 2,469.0</u> |
| d. | Exit Inverts | <u>El. 2,448.0</u> |
| e. | Emergency Drawdown Facilities | <u>None.</u> |

HYDROMETEOROLOGICAL GAGES

| | | |
|----|----------|-------------|
| a. | Type | <u>None</u> |
| b. | Location | <u>None</u> |
| c. | Records | <u>None</u> |

MAXIMUM NON-DAMAGING DISCHARGE Unknown

PAD

6/23/79

TED

6-30-79

Little Youngs, Henry Site No. 2 - Hydrology

SHEET NO. C-2 of

1. Determine Rainfall amount for PMF Design Storm

PMF rainfall for Garrett Co., Maryland = 26.8 in./6 hr.

obtained from "Design of Small Dams" pg 48
by U.S. Dept. of Interior.

Data based on Hydrometeorological Report No. 33
National Weather Service

Watershed Area = 0.48 mi.²

Reduction Factor = 0.8 (for watershed area < 10 mi.²)

Adjusted PMF rainfall = $0.8 \times 26.8 = \underline{21.4 \text{ in./6 hr.}}$

Adj. $\frac{1}{2}$ PMF rainfall = $\frac{1}{2} \times 21.4 = \underline{10.7 \text{ in./6 hr.}}$

APPENDIX D

PHOTOGRAPHS

PHOTOGRAPH 1 Overview of reservoir pool, shoreline, and side slopes.

PHOTOGRAPH 2 Emergency spillway inlet channel looking upstream.

PHOTOGRAPH 3 Principal spillway intake structure.

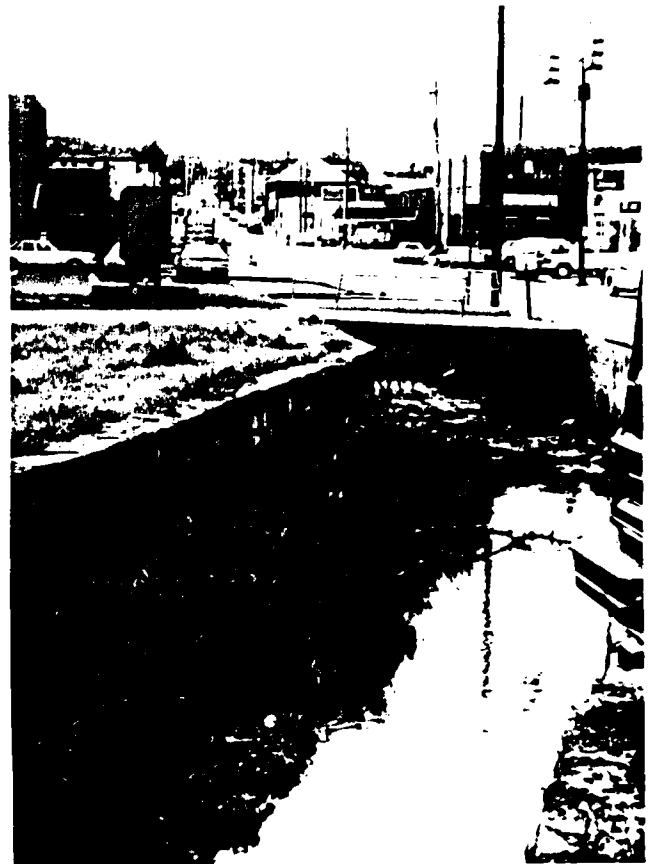
PHOTOGRAPH 4 Principal spillway outlet pipe (24 in. dia.) and seepage drain.





5

Overview of plunge pool and downstream channel.



6

Wilson Run stream channel, downtown Oakland.

APPENDIX E
REGIONAL LOCATION PLAN

APPENDIX F
REGIONAL GEOLOGY

LITTLE YOUGHIOGHENY SITE NO. 2
NATIONAL I.D. NO. MD 33
REGIONAL GEOLOGY

The Little Youghiogheny Dam Site No. 2 is located in the Allegheny Plateau Physiographic Province. The predominant macrostructure of the area is the northeast trending Deer Park Anticline which extends through eastern Garrett County into Pennsylvania. The dam site is structurally situated on the western flank of the Deer Park Anticline within the Pocono Formation and is located approximately 0.1 miles west of the Hampshire Formation contact. The lower Mississippian Pocono Formation is composed of strongly cross-bedded medium coarse grained quartzose sandstone interbedded with reddish-brown, non-calcareous siltstones and shales. The formation is exposed in a belt 1-2 miles wide forming the eastern and western flanks of the Deer Park Anticline. The Hampshire Formation consists of sandstones alternating with beds of shale.

The bedding at the site strikes approximately N 40° E and dips 26° NW. The bedding strikes the dam centerline at approximately a 90° angle.

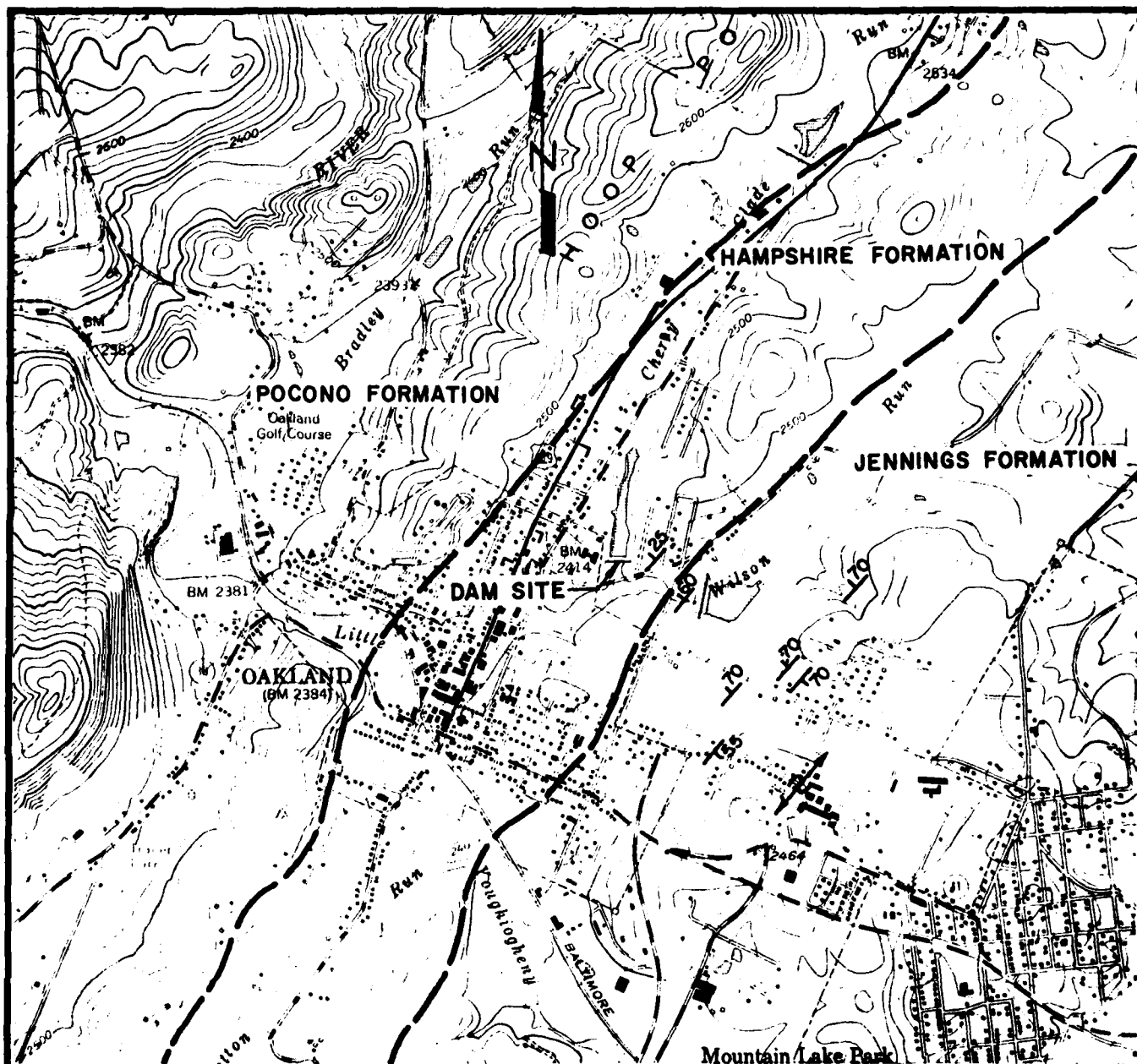
No faults, slides, large springs, or adverse geologic conditions were reported in R. F. Fonner's February 25, 1960, Geology Report of the site. A large spring was encountered approximately 100 yds. downstream from site No. 2 during the April 11, 1979, inspection of the site. It is located on the floodplain to the north west side of the exit channel.

References

Fonner, R. F., 1960, Geology Report of Little Youghiogheny River Dam Site No. 2.

Maryland Geological Survey, 1953, reprinted 1965, Geologic Map of Garrett County.

Maryland Geological Survey, revised 1961, reprinted 1966, Bulletin 19, Geography and Geology of Maryland.



OAKLAND QUADRANGLE, GARRETT COUNTY, MARYLAND

SCALE: 0 1/2 MILE 1: 24000

CONTOUR INTERVAL 20FT. DATUM IS MEAN SEA LEVEL

——— FORMATION CONTACT

170 STRIKE AND DIP

—O— OVERTURNED BEDS

DATA OBTAINED FROM MARYLAND GEOLOGICAL SURVEY'S GEOLOGIC MAP OF GARRETT COUNTY, 1953
REPRINTED 1965

| | | | |
|--------------------|--|--|--|
| E JULY 2, 1979 | NATIONAL DAM INSPECTION PROGRAM | | SITE GEOLOGY OF LITTLE YOUGHIOGHENY SITE #2 |
| SCALE: AS SHOWN | | | |
| DR: JLM CK: T.E.D. | ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS BALTIMORE, MD. | | |
| DWG. NO. F2 | | | |